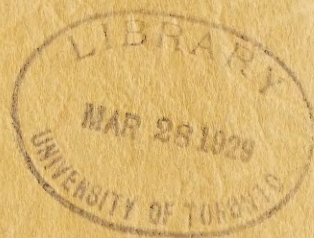


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Canada National Development Bureau

THE HUDSON BAY REGION



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THE HUDSON BAY REGION

By F. H. KITTO, F.R.G.S., M.E.I.C.

DEPARTMENT OF THE INTERIOR

HON. CHARLES STEWART, *Minister*

W. W. CORY, C.M.G., *Deputy Minister*

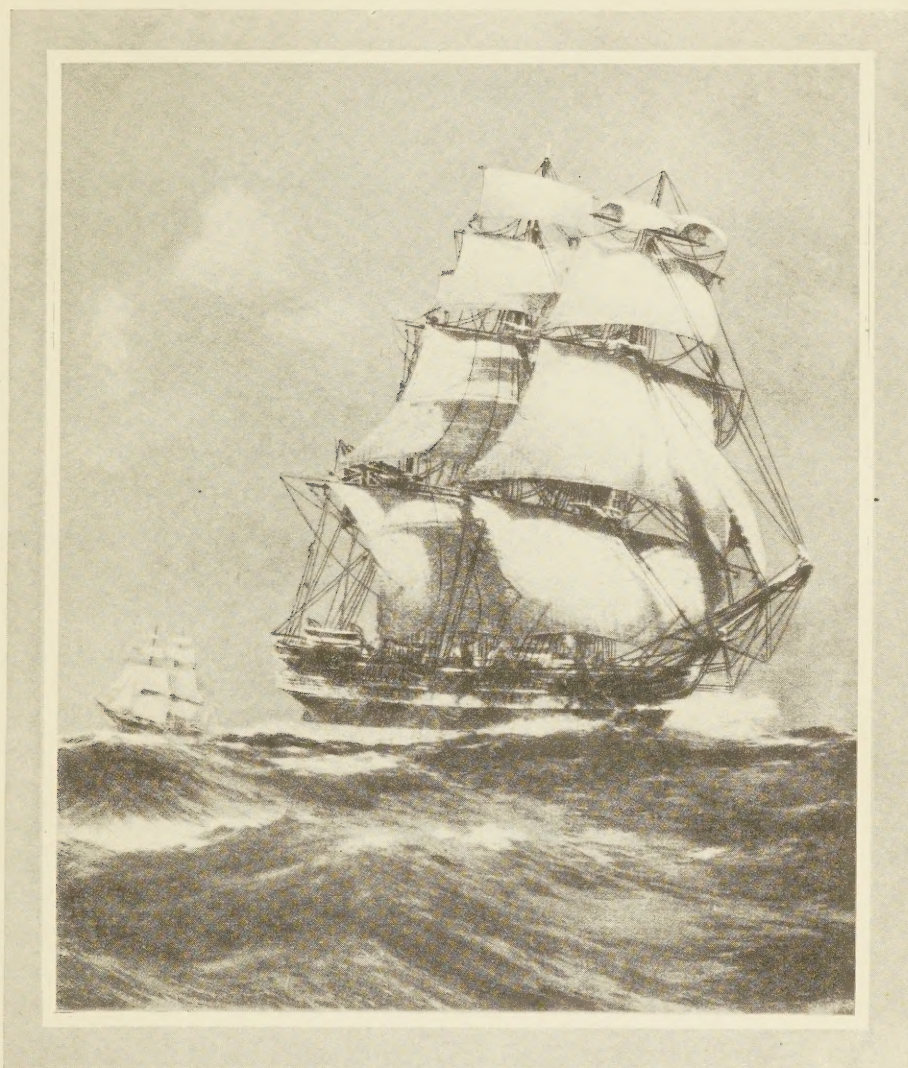
NATURAL RESOURCES INTELLIGENCE SERVICE

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In Hudson Bay in 1845.

Barques "Prince Albert" and "Prince Rupert," Hudson's Bay Company's trading vessels, off Mansel island, Hudson bay, 31st July, 1845. (From painting by J. Spurling for Hudson's Bay Co.)



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Prepared by Natural Resources Intelligence Service, Dept. of the Interior

The Hudson Bay Region

GENERAL DESCRIPTION

Recent announcements by the Canadian Government that the Hudson Bay division of the Canadian National Railways would be completed without further delay, and that Churchill instead of Port Nelson would be made the terminal port, have revived public interest in the Hudson Bay region. Physically and historically this region is of outstanding interest in Canadian development. In structure, it largely embodies one of the four major geological divisions of North America, the pre-Cambrian, the rocks of which are the oldest known to science and the foundation of a large part of the continent. In history, it has had a longer tenure under one flag than any other extensive part of the New World.

Physical Features

One of the most striking irregularities of the outline of North America is that caused by a remarkable intrusion of the sea to occupy expansive depressions extending deep into the interior of the main continental frame. This great inland sea is known as Hudson bay, and a lesser extension off its southerly limit as James bay. A passage from the Atlantic is called Hudson strait, and on its southerly course is a large expansion known as Ungava bay. To the north of Hudson bay, Foxe channel leads to Foxe basin, and from the basin a lesser channel, Fury and Hecla strait, gives connection to the Gulf of Boothia and Arctic waters, but these passages are almost continuously blocked by ice. Hudson bay and Hudson strait are the waters involved in the much discussed "Hudson Bay Route."

Extensive Water Areas Hudson bay, including James bay, measures nearly 1,000 miles from north to south and 600 miles from east to west at its greatest breadth, the total area being about 576,000 square miles. James bay itself is 250 miles from north to south and from 100 to 150 miles wide. The waters of Hudson bay are fairly deep, except along parts of its southwestern shore, but those of James bay are quite shallow.

Hudson strait is about 500 miles long and has an average width of over 100 miles. Ungava bay extends approximately 150 miles inland with about an equal breadth. Foxe channel is 120 miles wide at its narrowest point, and Foxe basin exceeds 200 miles in both length and breadth. Other features include Chesterfield inlet and Wager and Repulse bays on the northwest shore of Hudson bay.

Many large and small islands The main body of Hudson bay is quite open but Southampton island, 200 miles in either direction, lies in its northerly part. Several large islands are found in the outlet to Hudson strait and in the westerly end of the strait, of which the principal are Coats, Mansel, Nottingham, Salisbury, Charles, Mills and Digges. A maze of islands occurs along the easterly coast of Hudson bay and James bay. Included in this are the Ottawa, Sleepers, Nastapoka and Belcher groups in Hudson bay, and Akimiski, Twins and Charlton islands in James bay. The west coast is almost devoid of islands except well to the north where Marble and a few other islands are found. Akpatok island lies just within Ungava bay, and Resolution island at the north of the entrance to Hudson strait, off Baffin island and opposite Cape Chidley, which is the northerly limit of the Labrador coast.

Extensive Range of Longitude The entrance to Hudson strait is in approximate longitude $64^{\circ} 30'$ west, which is about the same as that of Moncton, New Brunswick, or of the St. Lawrence river at the west end of Anticosti island. Churchill harbour, which is located well to the extreme west side of Hudson bay, is in longitude $94^{\circ} 30'$ West, or almost due north of Kenora, Ontario, and lake of the Woods.

Though farther north where, owing to the configuration of the earth's surface, distances as represented by degrees of longitude are less, the Hudson bay route penetrates deeper into the interior of Canada than does the St. Lawrence system of waterways, its range being 30° of longitude, equivalent of half way from Halifax to Vancouver. The advantages to western Canadian development that this route would make possible, if found commercially favourable, are obvious.

Great pre-Cambrian Area Surrounding Hudson bay in the shape of a horse-shoe is a great plateau variously known as the Canadian or Archean Shield, the pre-Cambrian Shield or the Laurentian Plateau—the continental geological division referred to in a preceding statement. It occupies nearly the whole of Canada east of a line joining Great Bear lake and lake Winnipeg, except for the extreme southern parts of Ontario and Quebec, the Maritime provinces and an area adjacent to the south-westerly shores of Hudson bay often referred to as the Hudson Bay Lowlands. It also extends across the international boundary line to occupy an extensive area south and west of lake Superior and makes a small encroachment into New York State below lake Ontario. The total area of this division has been estimated to be nearly 2,000,000 square miles of which over 1,750,000 square miles are in Canada and Labrador.

The distinguishing features of this area are the predominating exposures of pre-Cambrian rocks that underlie it and a rugged and uneven surface. The average elevation above sea level is possibly 1,500 feet. There are few elevations that exceed 2,000 feet except to the northeast, where, along the coast of Labrador and in the eastern part of Baffin island, there are vertical cliffs rising from 1,000 feet to 2,000 feet in height and a few peaks said to be 5,000 or 6,000 feet high.

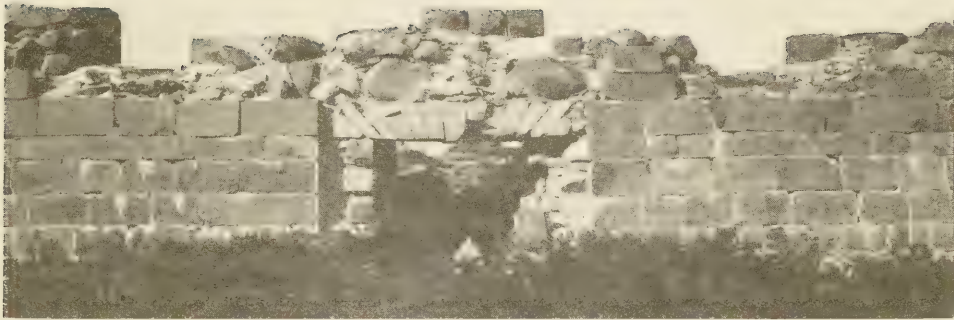
The average height of hills is from 100 to 200 feet above the general level, though along the north shores of lakes Superior and Huron it is much more. The bed of lake Superior reaches a depth of 400 feet below sea level and that of the Saguenay river 800 feet.

To the average observer the area is rough, rocky and hilly, broken by innumerable rivers, lakes, and streams, and notably

deficient in soil covering, the result of intense glaciation during the ice age. Difficult of traverse, unattractive to the land seeker, forbidding in general aspect, the Canadian Shield for many years was lightly valued and proved a serious physical barrier in separating the older provinces of eastern Canada from the newer agricultural settlements of the western plains.

Hudson Bay Drainage Basin On either arm of this plateau there is a low height of land running parallel to the general curve of the whole region and about midway between the waters of Hudson bay and the lands that surround the pre-Cambrian, so that the drainage is divided. On the northeast arm the rivers flow, on the one hand, to Hudson bay and adjacent waters, and, on the other hand, to the Atlantic coast and the St. Lawrence waterway. On the northwest arm the drainage is divided between Hudson bay and the Mackenzie basin. Midway and opposite the southwest shores of Hudson bay the pre-Cambrian rises but slightly, attaining an elevation at lake Winnipeg of a little over 700 feet. This general rise continues westward, including the bulk of the fertile belt of Canada's Great Plains region, which here adjoins the pre-Cambrian, and extending to the Rocky mountains. The vast agricultural regions drained by the Saskatchewan and Red River systems, which discharge into lake Winnipeg, form part of the Hudson Bay basin, as this lake is drained in turn by the Nelson river which flows into the bay. The total area of the Hudson Bay drainage basin is about 1,500,000 square miles, all of which lies in Canada except a comparatively small area at the head of Red river.

Many Rivers and Lakes Many rivers, both large and small, find their way to Hudson bay and its adjacent waters, of which the Nelson is the largest. With a drainage area of 370,800 square miles it exceeds that of the St. Lawrence and is surpassed in Canada by that of the Mackenzie alone. From east to west the principal rivers of the Hudson Bay region are:—George and Koksoak, flowing into Ungava bay; Nastapoka and Great Whale, entering Hudson bay on its east shore; Fort George, Eastmain, Broadback, Nottawa, Moose and Abitibi, Albany and Attawa-



Gateway of Old Fort Prince of Wales, Churchill.



Eskimo Whaleboat in Churchill Harbour.

piskat, flowing into James bay; Winisk and Severn, discharging into Hudson bay on its south shore; Hayes, Nelson and Churchill, entering on the west; and Kazan and Dubawnt, flowing into Baker lake and thence to the bay by way of Chesterfield inlet.

Around the outer fringe of the pre-Cambrian area is a chain of waterways including the following large bodies:—Great Bear lake, Great Slave lake, lake Athabaska, Reindeer lake, lake Winnipeg, lake of the Woods, lake Superior, Georgian bay and the St. Lawrence river. Within a smaller radius are found the following large lakes as well as innumerable smaller ones:—Dubawnt, Baker, Etawney, Southern Indian, Island, Nipigon, Abitibi and Mistassini.

Hudson Bay Region Defined The term "Hudson Bay Region" is an elastic one and does not refer to a definitely bounded area. Originally it might have been applied to the whole Hudson Bay drainage basin but today it is used in a more restricted sense. Certain areas farthest from the bay are now better known in relation to the political divisions in which they lie. If from the whole of this great drainage basin the following portions be eliminated, the remaining belt will approximately represent the area commonly known today as the Hudson Bay region. Those portions are:—the area primarily draining into lake Winnipeg; that part of the Churchill basin above the mouth of Reindeer river; and that part of the James bay slope south of the Canadian National transcontinental line. For purposes of description herein the Hudson Bay region is assumed to coincide roughly with this definition.

Historical Review

As a foundation for a study of the Hudson Bay region some knowledge, however limited, of its history is essential. The field is one of exceptional interest and dates from the earliest years of New World exploration. Space will not permit of more than the briefest outline here but the subject might be divided into three main periods, each having a distinctive bearing on the country's future, as follows:

1. Period of Discovery.
2. Period of Commercial Occupation and Exploration.
3. Period of Canadian Organization and Administration.

The main feature of the first period is the establishing of Great Britain's claims, by right of discovery, to the Hudson Bay country. That of the second period is the holding of this area during the troubled days of colonial struggles, and to the Hudson's Bay Company must be given due credit for the part it played. The third period is Canada's own administration of the country.

Period of Discovery The first period begins the year after the mainland of America was discovered, for it is now generally conceded that Cabot, in his second voyage of 1498, coasted as far north as the entrance to Hudson strait. Then followed a thrilling series of expeditions by English vessels, bent on discovering the mythical northwest passage that was supposed to afford a short route to the Orient. Failing in the main quest, these expeditions established Great Britain's claims to the Hudson Bay country. Mention only can be made here of the following most notable voyages; Frobisher in 1576-77-78; Davis, who distinctly observed and noted the entrance to Hudson strait, in 1585-86-87; Weymouth, who sailed a hundred leagues up the strait, in 1602; Hudson, who discovered this bay in 1610, explored its eastern coast, wintered at the foot of James bay and was cast adrift the following spring by a mutinous crew, and after whom both bay and strait are named; Button, who was sent by England to search for Hudson, in 1612-13; Baffin and Bylott in 1615 and Foxe and James in 1631.

Portuguese and Danish navigators made some early voyages but did not follow them up. Present day maps of the north are replete with place names that recall the feats of the early explorers and perpetuate the memory of many who took an active part in these operations or gave some support that made them possible.

Two French fur-trading adventurers, Grosielliers and Radisson, claimed to have reached Hudson or James bay overland from Canada in 1662 and at a later date the French made certain claims to the territory based on this feat. These adventurers, finding no support from their own countrymen, crossed to England and interested a number of influential men, including Prince Rupert, in sending a vessel to the bay in 1668 to trade in furs. The venture was so successful that it led to the formation of the Hudson's Bay Company and introduced a period of commercial occupation.

Second Period The second period, or the period of commercial occupation and exploration, might be called the **Hudson's Bay Company period** for in 1670 this newly formed company, with Prince Rupert as its first Governor, was granted a royal charter which gave it practically sovereign rights over the entire drainage basin of Hudson strait, or "Prince Rupert's Land" as it was promptly called. For two hundred years this company exercised its monopoly in the face of considerable opposition from home and foreign sources but its tenure at any rate had much to do with keeping the flag of Great Britain flying continuously.

Trade Expansion The preliminary expedition of 1668 built the first trading post in the Hudson Bay region at the mouth of Rupert river in James bay, calling it Fort Charles, the name later being changed to Rupert House. In quick succession additional posts, some heavily fortified, were established at Fort Nelson, Moose Factory, Fort Albany, Fort Severn, Eastmain and Churchill. No attempts were made to venture inland till 1720 when Henley House was built at a point 150 miles up the Albany river and in 1774 Cumberland House was built north of the Saskatchewan river.

The formation of the Northwest Company in Montreal in 1783 heralded an era of keen and at times violent rivalry for the fur trade of the inland districts, which was terminated only by the amalgamation of the companies in 1821 under the name of the Hudson's Bay Company. The great system of posts and routes that the more aggressive Canadian company had established as far as the western slopes of the Rocky mountains made the newly organized company one of the world's most powerful and far reaching commercial organizations.

Conflicts with the French For a hundred years the posts of the Hudson's Bay Company on the shores of Hudson and James bays were subject to intermittent attacks by French expeditions. Port Nelson was the storm centre of repeated assaults and counter assaults, too numerous to be mentioned here.

The lowest ebb in the Company's fortunes was reached in 1697 when a spectacular raid led by the fiery d'Iberville robbed it of all posts but one, Fort Albany. Fortunately for its future success England's claim to the Hudson Bay country was confirmed by the French in the Treaty of Utrecht, 1713, and all captured posts were restored.

Fears of future attacks led to the building of Fort Churchill in 1718, and, during the years 1733-44, of Fort Prince of Wales, which replaced it. The latter fort was one of the notable strongholds of North America, but in 1782 the French Admiral, La Pèrouse, swooped down on the bay with a 72-gun battle ship and captured it, as well as Fort Nelson. The fortifications of both were demolished before he sailed away. The ruins of Fort Prince of Wales are preserved as a Canadian Historic Site. Fort Nelson was replaced by York Factory, located in the mouth of Hayes river which has a common estuary with the Nelson.

Explorations and Surveys By the terms of its charter the Hudson's Bay Company was called upon to carry out explorations in its territory. Henry Kelsey, in 1691, and Anthony Hendry, in 1754-55, explored westward to the plains. Samuel Hearne in 1770-72 reached the mouth of the Coppermine river and returned by way of Great Slave lake. Governor Knight led an expedition by sea in 1719 to search for the Northwest passage but it was wrecked on Marble island. Capt. Middleton discovered Wager inlet and Repulse bay in 1741, and Christopher and Norton explored Chesterfield inlet in 1761-2. Among other Company explorers of later date might be mentioned Fidler, Turner, Dease and Simpson.

During this period many British expeditions carried on northern exploratory work, Sir John Franklin leading his first overland expedition, 1819-22, from York Factory. Other notable names associated with explorations in these parts include Ross, Parry, Richardson, Back and Rae. The many expeditions carried on during this period gave to the world a fairly accurate map of these northern regions.



Scene on Amisk Lake, Saskatchewan.



Indians taking whitefish from net, Amisk Lake, Saskatchewan.

Beginning of Colonization The activities of the Earl of Selkirk during his tenure of office as Governor of the company resulted in the establishing of the Red River Colony, the beginning of the present vast agricultural settlements of the Western prairies. In 1811 he obtained from the company a large grant of land for this purpose and in the following year established his colony, bringing in his settlers by way of York Factory. Thus the first line of communication between the agricultural areas of Western Canada and the Old Country was by way of the Hudson Bay route.

When, after Selkirk's death, his grant of land was allowed to revert to the Company in 1834, an era of colonization that could not be checked was forced upon it. The surrendering of territorial rights that the Company had long jealously claimed became inevitable. By an agreement made in 1869, Prince Rupert's land, with certain reservations, was surrendered to the British Crown, the Company assuming the status of an ordinary commercial concern. In 1870 this territory was formally added to the Dominion of Canada.

Canadian Period Canada has held Prince Rupert's Land and the Northwest Territory but little over half a century, yet in that short space of time rapid strides in national development have been made. The Red River Settlement was organized promptly in 1870 as the province of Manitoba. Step by step, as circumstances demanded, the organization of the more outlying areas was effected. The process involved the creating of various districts and territories, the boundaries and forms of administration of which were revised from time to time to keep abreast of developments.

In 1905 the provinces of Saskatchewan and Alberta were created from the former Northwest Territories, their northerly boundaries being fixed as the 60th parallel of north latitude. Immediately the older provinces of Quebec, Ontario and Manitoba renewed their claims to a greater share of the Hudson Bay lands and in 1912 the Dominion government acceded to these requests.

The boundaries of Quebec were enlarged to include the old Ungava District, thus swallowing up all of Prince Rupert's Land south of Hudson strait and Ungava bay and east of Hudson and James bays. Ontario and Manitoba were given the remainder of these lands on the south and west slopes of James and Hudson bays

as far as the 60th degree of north latitude. Ontario received over 600 miles of coast line on Hudson and James bays and Manitoba over 400 miles on Hudson bay including both Churchill and Nelson harbours.

In 1920 the boundaries of the Districts of Mackenzie, Keewatin and Franklin were defined. The west slope of Hudson bay, north of Manitoba and as far inland as Longitude 102° west, and all the islands in Hudson and James bays, were placed in Keewatin, and the Arctic islands, including those in Hudson strait, in Franklin.

Since the Hudson Bay region came into the possession of Canada many government expeditions have visited it to study its resources or to survey its principal features. Important geological investigations were made by Dr. Bell, A. P. Low, J. B. Tyrell, Wm. McInnis and other officials of the Geological Survey of Canada at early dates. Recent investigations of all resources, and surveys for various purposes are shedding much new light on its potential wealth and economic possibilities.

Climate

With a range in latitude of over 18 degrees, or about 1,250 miles, the Hudson Bay region has a wide variation of temperature. The more southerly part of the James Bay slope, including the great clay belt of Northern Ontario and Northern Quebec, lies between the 40th and 50th parallels of North latitude. The extreme north-westerly shore of Hudson bay is within the Arctic circle. Climatic conditions on the clay belt have been found favourable for the establishing of a successful agricultural industry. In the far north, of course, Arctic or sub-Arctic conditions prevail.

From south to north there is a gradual change, but the shortening of the growing season resulting from the increase in latitude is offset to a certain extent by the longer periods of daylight and greater amount of sunshine then prevailing. Conditions on the west coast are perhaps more favourable to vegetation than on the east coast though definite information is very limited. It is true, at any rate, that the curve of summer isotherms swings quite sharply to the north at a distance of a hundred miles or so west of the west shore of the bay, thus carrying the potential agricultural field as far north as Southern Indian lake in latitude $57^{\circ} 30'$ north.

Compared with corresponding latitudes on the prairies, the Hudson Bay region has a later spring and lower winter temperatures

but the midsummer months have about the same temperature. Precipitation is a little heavier, ranging from 15 to 30 inches annually, of which about a third falls as snow. In the clay belt south of James bay it averages from 20 to 28 inches. In the Nelson and Churchill belt summer frosts are liable to occur, though lands adjacent to water are fairly safe.

The lowest temperature recorded at Cape Fullerton (Lat. 64° N.) during the winter of 1903-4 by a government expedition that wintered there was 53° below zero. The lowest temperature recorded during December of 1927 by the air patrol parties wintering on Hudson strait was 30° below zero, and the highest was 32.4 degrees, just above freezing point.

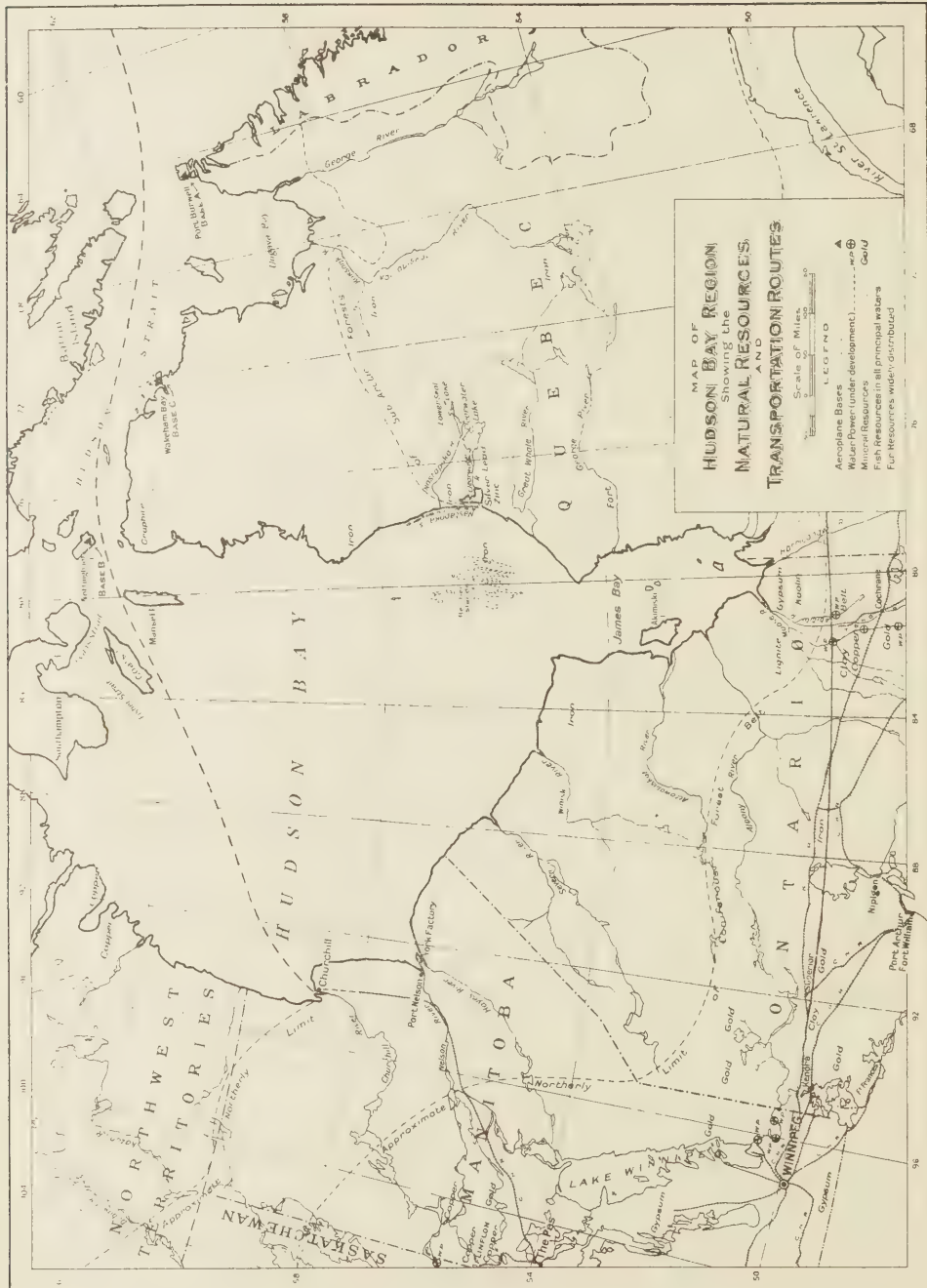
Population

The natives of the Hudson Bay region are the Esquimo and the North American Indian. At present the Esquimo population adjacent to the bay is about 1,300, of which 700 are found on the northwest coast and 600 on the east coast. Those on the northwest come as far south as Churchill to trade but those on the east frequent posts as far south as James bay. The Esquimos are nomads and live by hunting and fishing.

The Indians hunt and trap over most of the wooded areas of the region but do not overlap the Esquimo territory. They are found in scattered bands on all the principal rivers and lakes. Many are living on reserves. It is estimated that they number about 1,400 in Northern Quebec, 1,275 in Ontario north of the Canadian National transcontinental line, and 4,500 in Northern Manitoba.

Until recent years the white population was restricted to a handful of traders, trappers, missionaries and police and transient prospectors and explorers. Mining activities are now attracting thousands to the new camps and prospectors are spreading out over the country in greater numbers than ever before.

The Hudson's Bay Company and Revillon Frères have trading posts scattered at strategic points throughout the whole region, while on the borders of the Northern Quebec, Ontario and Manitoba frontiers several towns are springing up. Cochrane, in Northern Ontario, and The Pas, in Northern Manitoba, are headquarters for considerable activities on James bay and the west coast of Hudson bay respectively.



NATURAL RESOURCES

Except in furs, the Hudson Bay region has not generally been credited with possessing any great stores of natural resources. Recent discoveries and investigations indicate that the region is far from being the barren waste so long pictured. Productive lands and commercial forests are found to some extent at least. In minerals, the region has startling possibilities and great blocks of water power on all principal rivers await development. Fur-bearing and game animals, after more than 250 years taking, still maintain their numbers fairly well and the fisheries of both salt and fresh waters are extensive and varied.

Lands

The Canadian Shield, on the whole, has a small percentage of land surface suitable for agricultural purposes, but there are numerous exceptions. The most notable one is the great clay belt of Northern Ontario and Northern Quebec. Lying almost wholly on the James bay slope is an area of 30 million acres, or more, of fertile land which is being settled and successfully developed by an agricultural population. The Lake St. John area in Quebec, north of the St. Lawrence river, and the Rainy River district in Ontario, west of lake Superior, are other examples of arable lands.

Clay Belt on Hudson Bay Railway In Northern Manitoba there is another clay belt estimated to cover an area of about 10,000 square miles or 6,400,000 acres, of which from 50 to 75 per cent is thought to be arable. This belt lies principally between the Nelson and Churchill rivers and is traversed by the Hudson Bay railway which reaches it about 130 miles from The Pas. The soils of this area were deposited as beds of old lakes and are well suited to mixed farming.

There are many extensive areas of swamp soils, which in their present state are almost worthless owing to lack of drainage but

which are capable of producing good crops of hay, grain and vegetables when cleared, drained and brought under cultivation.

Along the shores and in the valleys of innumerable lakes and rivers are to be found scattered areas of exceedingly fertile alluvial soils. While from an agricultural standpoint alone these lands are too limited and difficult of access to be recommended for settlement, they have a real value when other developments in their vicinity, create a local market for garden and dairy produce. With the influx of a mining population any such tracts of land within a reasonable distance of a mine centre will offer good inducements for development.

Agricultural Test-Plots Agricultural co-operative test plots have been established by the federal Department of Agriculture at The Pas, Port Nelson and the following intermediate points along the Hudson Bay railway—Cormorant lake, Mile 82, Mile 137 and Mile 185. Very encouraging results have been obtained from the experiments conducted on these plots. High-grade samples of hard spring wheat produced on some of them attest to the grain-growing possibilities of the country, and potatoes and vegetables have yielded excellent returns in all cases.

Missionaries and fur traders report excellent results from their efforts over long periods of years in establishing flower and kitchen gardens and hay meadows about their establishments. Almost anywhere as far north as Churchill the areas of soil that have been tested have been found to respond to cultivation. With the general development of the country there will doubtless be found scope for a limited scattered farming and horticultural industry catering to the local rather than the export markets though the larger clay belts will export grain, cattle and other produce.

Forests

The Hudson Bay region, with respect to forests, might be divided into three parallel belts running from east to west and northwest. These belts, from north to south, are the treeless belt, the sub-Arctic belt and the coniferous belt.

The treeless belt includes all the territory adjacent to the north part of Hudson bay and Hudson strait. East of the bay and south of the strait it extends as far as a line joining the mouth of Nastapoka river and the foot of Ungava bay. On the west shore of Hudson bay it reaches as far south as Churchill but it gives way farther inland to the sub-Arctic belt, the contact following an approximate northwest direction.

This belt has an Arctic vegetation consisting of mosses, lichens, heath plants, arctic flowers and, in favoured localities, scrub willows and some grasses.

Sub-Arctic Forests South of the Arctic belt is the sub-Arctic belt which includes all the lands immediately surrounding the remaining part of Hudson bay and James bay. It extends about 100 miles south of the foot of James bay and easterly along that latitude, approximately 50° North, to the Atlantic coast. West of James bay and south and west of Hudson bay it runs in a northwesterly direction far beyond the limits of the Hudson Bay drainage basin, having a varying breadth of from 200 to 400 miles.

In this belt are found several species of trees and shrubs ranging from scrub willow and stunted black and white spruce and tamarack to fairly large specimens of white spruce and balsam. East of James bay there are also small quantities of jack pine, balsam fir and balsam poplar. West of James bay and south and west of Hudson bay some canoe birch is found as well as aspen and balsam poplar, jack pine, balsam fir and, near the height of land north of lake Nipigon, some white cedar.

Severe climatic conditions, lack of drainage and repeated fires have prevented these forests from attaining any great commercial value. There are several large areas of muskeg, quite treeless except for a little stunted black spruce and scrub. It is possible that drainage and protection from fire might result in the production of a better forest, though the rate of tree growth is slow.



Potatoes, Carrots and Beans. Grown at Split Lake, Northern Manitoba.



The Finger Company's Sawmill. The Pas, Manitoba

Valuable Pulp Woods Along the height of land that lies between the Hudson bay and St. Lawrence slopes in Northern Quebec and Northern Ontario is a great timbered belt, often referred to as the eastern coniferous forests. Practically the same belt, known as the northwestern coniferous forests, extends to the Rocky mountains and beyond, swinging north-westerly from the Ontario-Manitoba boundary to include the Lake Winnipeg and upper Churchill River areas of Central Manitoba and Northern Saskatchewan. The principal trees of this belt are the white and black spruce, jack pine, balsam fir, aspen and balsam poplar. The chief commercial specie is the white spruce, which here attains good sawmill dimensions. Great quantities of pulpwood are also available as well as tie material, mine props, poles, cordwood and fencing material.

Several pulp and paper mills are already in operation in Northern Quebec and Northern Ontario, and one near the south end of lake Winnipeg. Similar developments are possible on the lower Saskatchewan river and on the Nelson river. A number of sawmills operate in this belt, that at The Pas being one of the largest.

Minerals

In comparatively recent years the great pre-Cambrian area that surrounds Hudson bay has given startling evidence of being one of the world's largest storehouses of precious metals and other mineral wealth. In similar formations are found the Rand of South Africa, the Mysore Mines of India and most of the great mines of Australia.

Notable Mining Achievements The Canadian Shield has several achievements of world-wide fame to its credit as a mineral-producing area. Among such might be mentioned the Sudbury nickel-copper camps which are the source of 90 per cent of the world's nickel supply; the Ontario silver fields which have yielded over 382,000,000 ounces of silver; and the Porcupine, Kirkland Lake, and Rouyn gold and copper-zinc-gold fields on the James Bay slope and adjacent height of land, the former camp including the famous Hollinger mine, one of the three largest gold producers of the world.

Great outputs are expected also from the tremendous copper-zinc ore bodies of Flin-Flon and Sherritt-Gordon in Northern Manitoba, where extensive programs of development are now under way, and the massive bodies of iron-bearing ore on the Belcher islands in Hudson bay. Other known mineral fields include the Chibougamau Lake district in Northern Quebec; the Red, Narrow and Woman Lakes areas of Northwestern Ontario; the Central Manitoba mining area; the gold-bearing areas of Amisk lake in Northern Saskatchewan and Elbow and Wekusko lakes in Northern Manitoba and the native copper areas on the Coppermine river.

Wide Range of Minerals The pre-Cambrian formation is known to contain also occurrences of apatite, corundum, feldspar, graphite, gypsum, kaolin, molybdenite, talc and the rare metals of the platinum group. Huge deposits of china clay and gypsum have been located on the James Bay slope north of the Canadian National railway in Ontario and occurrences of lignite have been reported on the lower portions of the Moose and Abitibi rivers. Occurrences of lead and zinc are reported at lake Mistassini and on the east coast of Hudson bay near the mouth of Little Whale river. Iron and gypsum have been found on the south shores of Hudson strait and Ungava bay and great deposits of copper ore are believed to be on the west coast of Hudson bay near Chesterfield inlet. It is definitely known that lignite of an excellent quality occurs in formation of later geological age on Baffin island and extensive deposits of coal in the Carboniferous or Tertiary formations of several northern islands.

Most of the great mining developments mentioned, excepting that of Flin-Flon, are more adjacent to Ontario and Quebec centres and do not fall within the Hudson Bay region as popularly defined but they are in the same pre-Cambrian formation. Taking into consideration this fact, together with the fact that many indications have been found already of the presence of a wide range of the same metals throughout the Hudson Bay region, and remembering that intensive prospecting is merely getting under way, it is not unreasonable to expect that the mineral resources of this region will largely offset its deficiency in fertile lands and commercial forests.

Water Powers

The physical characteristics of the Canadian Shield are exceptionally favourable for the creating and developing of a great water-power resource which will be of inestimable value in connection with mineral development and forest and other industries. The numerous lakes serve as ideal reservoirs, the controlling of their flows being comparatively simple. The rugged nature of the country has provided hundreds of rivers having well defined banks of rock, and with falls and rapids everywhere that can be harnessed with a minimum of effort.

Much Power Available The water power resources of the Hudson Bay region are known to be very great. The Dominion Water Power and Reclamation Service has secured considerable data respecting them and has made the following estimates of their extent. In the area directly tributary to Hudson and James bays, that is to say the whole tributary watershed exclusive of the area draining first into lake Winnipeg, the estimated horse power available under conditions of ordinary minimum flow exceeds five million, while it is estimated that nearly nine million horse power is available for six months of the year. Of these resources nearly one-half is provided by the Nelson river. The total ordinary minimum figures are contributed 56 per cent by Manitoba, 26 per cent by Quebec, 11 per cent by Ontario, and 7 per cent by Saskatchewan.

This Service further reports that the power development in this area has, so far, been restricted to Ontario where installations, amounting to a little over two hundred thousand horse power, have been made on the Abitibi, Mattagami and Kapuskasing rivers, primarily for the mining and the pulp and paper industries, although these developments also provide power for local municipal and domestic uses. A development on the Churchill river in Saskatchewan to provide power for the Flin-Flon mine is now imminent.

Fur and Game

The fur resources of the Hudson Bay region constituted one of the great prizes revealed by the discovery of America. Great Britain claimed the country by right of discovery but held it for centuries



Island Falls, Churchill River, Saskatchewan.



Whitemud Falls, Nelson River, Manitoba.

because of its fur resources alone, giving little credit to the possibilities of other resources or developments. The Hudson's Bay Company was organized primarily as a fur trading venture and for two hundred years paid but little attention to any other form of development. Though the fur bearing animals of the region have been hunted and killed for their peltries all these years few species, if any, have been exterminated, and the fur trade is still the principal commerce of a large part of the territory.

Valuable Fur-bearing Animals The most valuable fur bearing animals of the Hudson Bay region are the beaver, otter, marten, fisher, mink, muskrat, bear, wolf, lynx, coyote, wolverine, fox, skunk and weasel or ermine. It is recorded that the Hudson's Bay Company's trade of the year 1679 included 10,500 beaver, 1,100 marten and great numbers of other skins. For a long time the beaver was the most prized fur and a beaver skin was made a unit of value for all barter. Of late years the beaver has shown serious evidences of disappearing and is now receiving protection in the way of closed or limited seasons. For some years the muskrat was the most sought fur, as many as a million pelts being taken in the delta of the Saskatchewan river in a single season. Steps to prevent over-trapping of this valuable little bearer have been taken.

The beaver's favourite food is the bark of poplar and birch trees, hence it is not found farther north than the range of these. The muskrat prefers low, swampy regions with plenty of water and coarse vegetation. Polar bears and white and blue foxes are restricted to the more northerly regions. All the other animals mentioned are widely distributed. There are several species of foxes including the white, red, cross, blue, silver and black. Commercial fur farming has been successfully introduced in a number of instances.

Big Game Animals The principal big game animals of the Hudson Bay region are the moose, elk, caribou, musk-ox and deer. The moose has a wide range almost as far north as the limit of the sub-Arctic forest belt. Elk were quite numerous on the west slope of Hudson bay many years ago but have almost

disappeared. The "barren-land" caribou is the most prolific of game animals in this region, wandering over the treeless belt in herds of many thousands. In the sub-Arctic belt lesser numbers of "woodland" caribou are found. The musk-ox, the distinctive animal of Northern Canada, is becoming very rare. A few still range over certain areas on the mainland in the treeless belt, but the main remnant of the specie is found on the Arctic islands. A few deer are found in the southerly parts of the coniferous belt.

Migratory and Native Birds Native game birds include two or three species of grouse and the distinctive northern ptarmigan. Migratory game birds in large numbers make the shores of Hudson bay and adjacent waters their summer breeding grounds. Canada geese, ducks of many species, including the prized eider duck, swans, snipe and other shore birds spread over the region in great numbers every summer.

Fisheries

The fisheries of Hudson bay and of the lakes and rivers that drain into it are quite extensive and with proper conservation should prove the source of a perpetual food supply for local use and export. Up to the present time commercial fishing operations have been restricted to those waters within economic range of shipping facilities. With the completion of the Hudson Bay railway to Churchill and possibly of the Temiskaming and Northern Ontario railway to James bay the fisheries of Hudson and James bays will be developed to some extent.

Valuable Fish Resources The principal commercial fresh water species are pickerel, whitefish, tullibee, sturgeon and pike. The whitefish of these northern waters is a particularly desirable fish having a firmness and flavour that cannot be excelled. The same might be said of the lake trout which is taken in lesser quantities. Other commercial species include catfish, goldeyes, mullets and perch. The commercial catch of all these species in the province of Manitoba alone in 1925 was valued at one and a half million dollars. Throughout the whole Hudson Bay

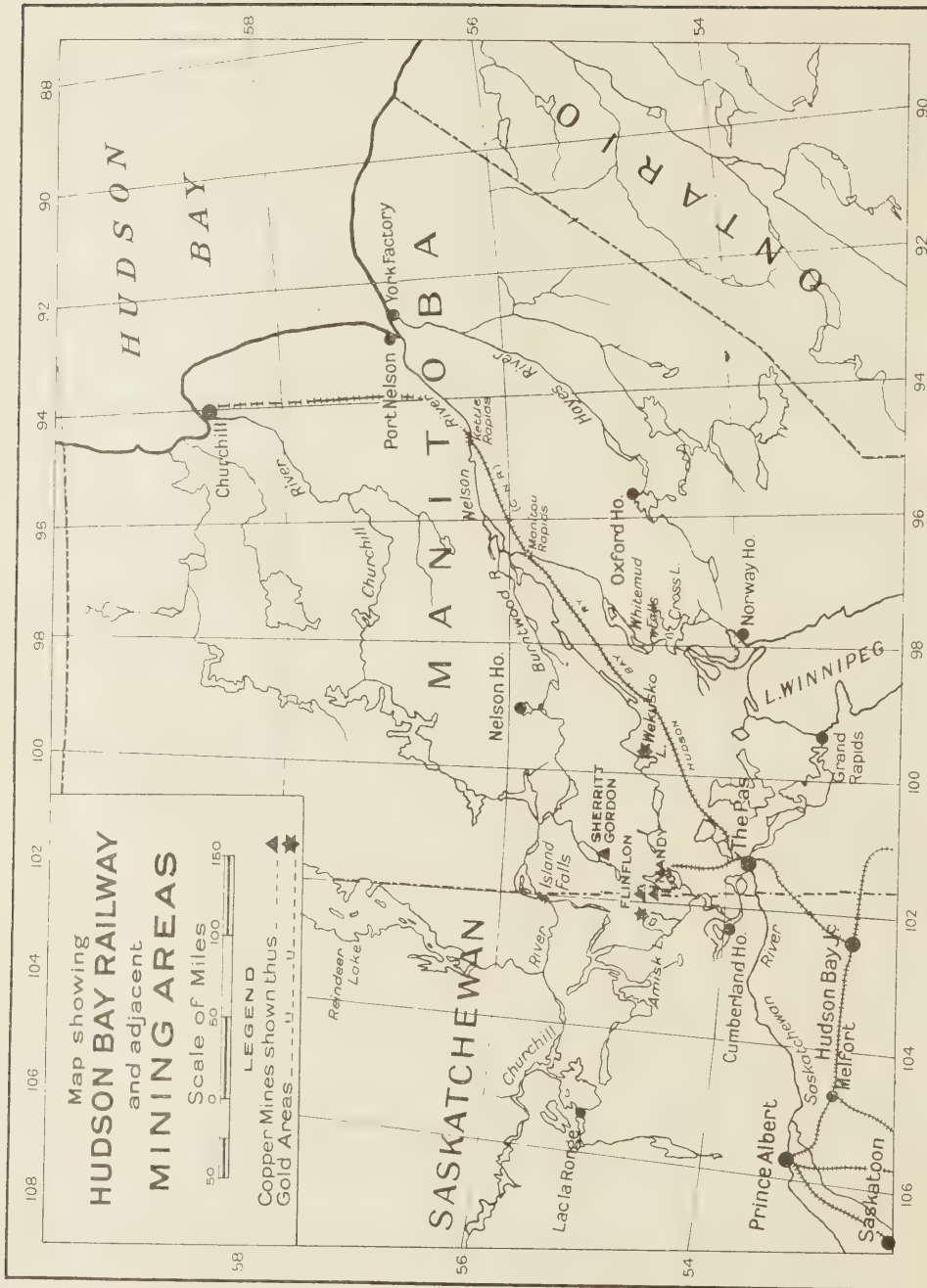
region fish form a staple and dependable article of diet for the native population and to a certain extent for white men as well. The coarser species of fish, principally suckers, are freely used for feeding the numerous dogs that provide the only means of winter transportation in many northern districts.

The fish resources of Hudson bay and adjacent salt waters are not yet well known as no attempt has been made to commercially develop them. Lack of transportation facilities, unsuitable shores and distances involved have prevented any serious attempts from being made to establish a fishing industry in these waters. True cod are found in Ungava bay and rock or Greenland cod have been taken along the east coast of Hudson and James bays. Capelin are plentiful in both bays as well as the so-called lake herring or lesser white fish. Salmon are found in the northern part of Hudson bay and in the lower parts of the rivers emptying into it which they ascend during the spawning season. The sculpin or wind fish is also found.

The whole Hudson Bay region, being broken by networks of countless rivers and lakes, has ideal physical conditions for a widely distributed fish resource. Moreover the clearness and coldness of these waters, with constant flow and ample supplies of fish food, are conditions that tend to produce a fish of high value, as attested by competent authorities. These conditions are particularly favourable for meeting local demands, a factor of great importance in the development of mining resources throughout a region devoid of convenient farm supplies.

**Sea Mammals
of Hudson
Bay**

The northern waters of the Hudson Bay regions produce also limited numbers of seal and walrus but these mammals are not found in any great numbers and their taking is pretty well restricted to meeting the requirement of the native population in food and clothing. For several years considerable whaling was done by American and Scottish whalers but the more valuable species of this great sea mammal are now very rare. The more common types met with today are the Big Finn, Little Finner, Humpback, Killer and the white whale or porpoise, which is fairly common in Hudson and James bays.



MINING DEVELOPMENT

Some of the great mining developments that are taking place in Canada's pre-Cambrian area are located wholly or partly within the limits of the Hudson Bay drainage basin. The Porcupine, Kirkland Lake and Rouyn gold fields of Northern Ontario and Northern Quebec are largely tributary to James bay. The Western Ontario and Central Manitoba gold fields that radiate from the lake of the Woods, Rainy lake and the southeast shores of lake Winnipeg, lie within the drainage basin of the latter lake, which discharges its overflow to Hudson bay by Nelson river. The great mineral belt of Northern Manitoba and Northern Saskatchewan, in which are found the Flin-Flon, Sherritt-Gordon, Mandy, and other new properties, lies north of the Saskatchewan and Nelson rivers and south of the Churchill.

Northern Mineral Belt

This "Northern Manitoba Mineral Belt," as it is popularly called, is in fairly close proximity to the Hudson Bay railway. Its development is, consequently, very closely associated with the general development of the Hudson Bay territory as a whole and of this transportation route in particular. It is this mining field that the public generally associates with the Hudson Bay region. The others are better known in relation to the province in which they lie.

In Manitoba and Saskatchewan The mineral belt of Northern Manitoba, or more correctly of Northern Saskatchewan and Northern Manitoba, occupies a strip of territory about 125 miles in length from west to east and varying in width from possibly 25 to 50 miles. These dimensions must be considered very approximate as further explorations and new discoveries may shed such additional light on the resources of the area at large as to considerably alter preliminary estimates respecting bounds. The westerly part of the belt lies on either side of the Saskatchewan-Manitoba boundary line, about mid-way between

the Saskatchewan and Churchill rivers and in approximate latitude 55° North.

Geologically this belt is of mineralized ancient pre-Cambrian volcanics and sediments. A peculiarity of the massive flow rocks is their prevailing greenish colour. On this account they are commonly referred to as greenstones and it is in these greenstones that many ore bodies have been found.

A Lake Region The topography of the district presents a maze of low, rocky hills, swampy ravines and countless lakes of every size and shape, dotted with numerous islands and drained by networks of wandering streams. From west to east is a well-defined chain of lakes which constituted the principal route of travel for the early prospectors. Beginning with Amisk (or Beaver) lake, which lies in the province of Saskatchewan, the chain includes Flinflon, on the Saskatchewan-Manitoba boundary, Schist, Athapapuskow, Cranberry group of three, Elbow, Island (now called Iskwasum) Reed and Wekusko (or Herb) lakes. From Wekusko lake a 12-mile wagon road was constructed to meet the Hudson Bay railroad at Mile 82 from The Pas and another wagon road was built from Sturgeon Landing, at the head of Namew lake, to Athapapuskow lake, to afford a more direct route to Flinflon than that by way of Amisk lake.

Beaver Lake Gold Field

Mining activities in this northern district got under way in 1912 when discoveries of free gold in quartz on the north shores of Amisk lake, then better known as Beaver lake, by prospectors from Prince Albert, led to a rush in which over 1,200 claims were staked and considerable development work was undertaken. The Beaver Lake Gold Mining and Development Company, Limited, early organized the "Prince Albert" group of 33 claims and commenced active mining operations. A shaft was sunk to a depth of 76 feet on a vein of gold-bearing quartz that assayed as high as \$40 a ton and a complete outfit of machinery required in the erection of a mill and cyanide plant was assembled on the ground. Several other companies and individuals did much preliminary work.

Steamboat Navigation The Ross Navigation Company of The Pas put a steamer on the run from The Pas to Shining bay at the northwest extremity of Namew lake, which was the nearest point of approach to the mines. The route followed the Saskatchewan river and Cumberland and Namew lakes and connecting waters, with historic Cumberland House a point of call. From Shining bay the Saskatchewan government cut out an 18-mile wagon trail to the foot of Amisk lake and at its northerly terminus there grew up a little outpost called Beaver Landing.

Canoemen made use of the Sturgeon-Weir river, which runs from Amisk lake to Namew lake and is about 30 miles in length, and for a time this westerly part of the belt was the centre of activity. Gradually other discoveries were made as prospectors spread out and sections lying farther to the east soon eclipsed the original fields in interest. The war brought about unforeseen conditions that seriously retarded development work and comparatively little progress has been made on Amisk lake, though it is confidently expected that a revival of activity is not far distant.

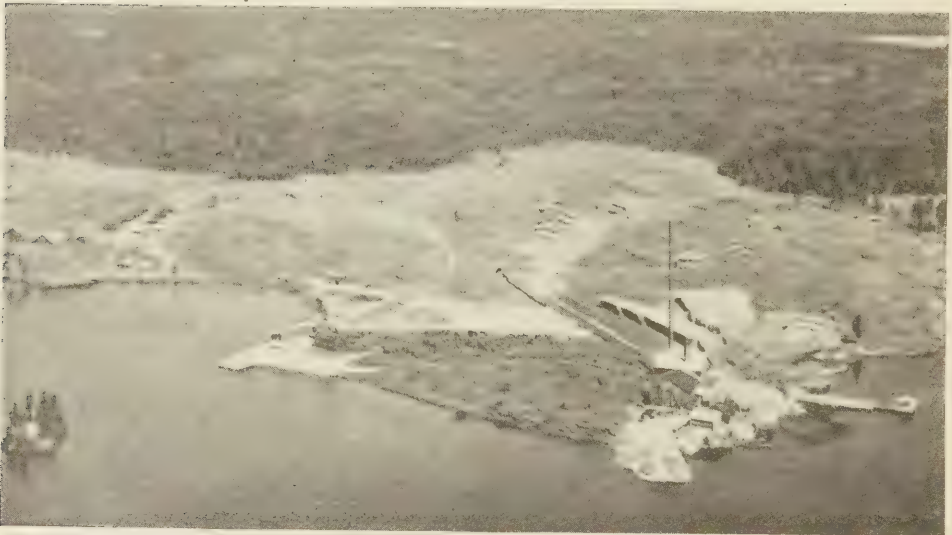
The Flin-Flon Mine

The actual development of the Flin-Flon mine, which is well under way, will bring this northern mineral belt into the ranks of the world's big producing areas. The Flin-Flon ore body is a massive deposit of copper-zinc sulphide carrying also values in gold and silver. It was discovered in 1915 by Thos. Creighton and five associate prospectors who were backed by the Hammill-Currie-Foster syndicate of Toronto. During the following year about \$50,000 was spent in diamond drilling which indicated the presence of at least 16,000,000 tons of ore. Intermittent examinations continued for several years and a number of mining companies became interested for varying periods, but the magnitude of the proposition, its isolated location and the decline in metal prices following the close of the war were factors that served to discourage early development.

Finally, late in 1927, the Harry Payne Whitney Syndicate of New York exercised an option it held to buy, and definite arrangements for development were quickly announced. In addition to the



Original Flin-Flon Camp, 1916.



The Flin-Flon Mine in 1927.

original group of ten claims much larger holdings were secured, embracing in all some 153 claims having an area of nearly 6,000 acres. These are held under lease from the Federal government. Active mining operations will be carried on by a company organized as "Flin-Flon Mines Limited" which is controlled by a holding company having water power and other interests in the district and called the "Hudson Bay Mining and Smelting Company, Limited."

Extensive Plans Under Way Plans for the working of this enormous body of low-grade ore demanded the erection of a smelter on the ground and thereby made imperative the building of a railway to the scene. Arrangements were completed for a branch line from the Hudson Bay railway and work on both railway and mine was rushed. It is reported that the mine plant under construction, including flotation mill with cyanide annex, copper smelter and electrolytic zinc plant, will make possible the mining and treating of 3,000 tons of ore a day. Over one third of the tonnage will be mined by electric power shovels from an open pit. Hydro-electric plants and transmission lines also will be constructed and in this connection it has been announced that the Island Falls site on Churchill river in Saskatchewan will be utilized. The construction and completion of the necessary plant and works will require a period of approximately four years, and when brought to the producing stage employment will be afforded for about 1,000 persons. The 88-mile branch railway was completed before the end of 1928.

The Mandy Mine

On the northwest arm of Schist lake and about 4 miles southeast of Flin-Flon lake another discovery was made in 1915. In the following year diamond drilling disclosed an ore body of about 25,000 tons of massive chalcopyrite averaging about 20 per cent copper with additional gold and silver values of \$5 a ton, and about 180,000 tons of lower grade copper-zinc sulphide ore. This property was taken over very soon after its discovery by the Tonopah Mining Company of Denver and a subsidiary organization called the Mandy Mining Company was formed to develop it.

Taking advantage of the high price of copper during the war years, the richest part of the ore body was mined out and shipped to a smelter at Trail, British Columbia, for treatment. This feat involved unusual transportation costs, the ore being hauled many miles by horse-drawn sleighs, moved still greater distances by river or lake barges and finally shipped many hundreds of miles by rail; yet during the four years 1917-20 inclusive, 25,000 tons were moved. The value of copper recovered exceeded \$2,000,000, and that recovered in gold and silver was considerable.

Operations were temporarily suspended when no longer profitable under such unusual conditions, but, with the prospect of being able to have the lower-grade ores treated at a smelter on the adjacent Flin-Flon property, there has been a revival of activity. Additional explorations have revealed the presence of a much greater ore reserve than first estimates suggested and the prospects are that the Mandy mine will become a large producer under the more favourable conditions that are developing.

Wekusko Lake Gold Field

Working eastward from Amisk lake and westward from the Hudson Bay railway, prospectors, in 1914, found many indications of free gold in quartz veins occurring on the shores of Wekusko lake, also known as Herb lake. Hundreds of claims were staked and considerable development work with varying degrees of success was prosecuted on several of these. Numbers of companies were formed and a few mills were set up but the production of gold to date has not been large.

Hydro-electric power is required for the profitable operation of these mines and it was expected that this would be supplied by the development of the Whitemud Falls site on Nelson river and the building of a transmission line to Flinflon lake to supply power to the Flin-Flon mine. In this case the transmission line would have passed through the Wekusko Lake district, but the selection of the Island Falls site has shattered these expectations. Plans for the securing of power by other arrangements are being discussed and it is expected that the Wekusko gold fields will eventually be placed on a sound producing basis.

Sherritt-Gordon Mine

Spreading out in every direction, prospectors have made many important discoveries of minerals in all parts of this great belt. Scarcely a day goes by that new discoveries are not reported. What appears to be one of the biggest ore bodies yet found, or possibly the biggest, is the Sherritt-Gordon copper-zinc deposit on Cold or Kississing lake, about 40 miles northeast of Flinflon lake.

Development work completed to date has definitely placed this property in the big mine class. Arrangements for the construction of a 1,500 ton concentrator were announced recently, which, it is expected, will be ready for operation by January, 1931. An off-shoot of the Flin-Flon branch railway will be constructed during 1929, from Cranberry Portage to the mine, a distance of about 42 miles. A strong company has been organized to carry out developments, and production from the Sherritt-Gordon is only a matter of time.

Other Developments

Space will not permit the enumeration of the many potential mines that are in process of investigation or development, such as the Callinan Flin-Flon, the Manitoba Basin and others. Doubtless many promising looking claims will be found economically worthless. Others may be worked to a greater or lesser degree of advantage in connection with the larger mines, while the development of other great mines similar to the Flin-Flon, Mandy and Sherritt-Gordon is not improbable. Once the district gets under way as a producing mining field, conditions will become more stabilized. Hitherto the region has been isolated, scantily peopled and difficult of access. New mining centres will spring up here and there. Already towns are in the making at Flinflon lake, Cranberry portage and Cold lake. With a mining population on the ground and the advent of capital it is safe to assume that the resources of the belt will be systematically sought out and developed with less delay than has been necessary in the past.

**Prospecting
by Aeroplane** In passing it is worth mentioning, as an example of the trend of modern methods in mining development, that the aeroplane has been called into service for prospecting in the Hudson Bay region. Huge craft, capable of transporting men and supplies, are made use of in reaching distant fields, being able to cover in a few hours intervening wilderness territory that would require weeks of time by former methods. During July of 1928 two prospecting expeditions sailed from Halifax and St. John, each prepared to spend a couple of years in searching for minerals in Hudson Bay fields. Included in the full equipment carried by each vessel were aeroplanes.

TRANSPORTATION

The possibility of developing a commercially feasible Hudson Bay route, long the subject of much debate, is now being put to the test. Work on the completion of the Hudson Bay railroad and on necessary harbour terminals at Churchill is being energetically carried forward by the Federal Department of Railways and Canals. At the same time the Department of Marine and Fisheries is making a study of ice and weather conditions in Hudson strait with a view to determining ways and means of aiding navigation therein. It is expected that the year 1930 will witness initial shipping operations by this route.

Early Voyages to the Bay Though centuries have lapsed since the waters of Hudson bay were first furrowed by the keels of European vessels no serious attempt to utilize this natural route on a large scale was made before the present undertaking was launched. The navigation of these waters can be summed up in a few words. The vessel that led the way was Henry Hudson's staunch little "Discovery" and the year was 1610. The mouth of Nelson river anchored its first vessel in 1612 when Sir Thomas Button, in search of Hudson, decided to winter there. The Danish explorer, Munk, is believed to have entered Churchill harbour in the fall of 1619, and to have wintered there. Other vessels, bent on exploration, followed, and in 1668 the first trading ship, the "Non-such," sailed into the bay to return the following year with a cargo of furs and thus inaugurate commercial carriage by this route.

The Hudson's Bay Company have utilized these waters for over 250 years. During this period several hundred voyages were made with the loss of two or three vessels only. Ships of war, whaling ships and other craft bent on plunder, trade or exploration have passed through Hudson strait to the bay at various times, as many



Stanley, Churchill River, Northern Saskatchewan.



English Church Mission on Lac la Ronge, Saskatchewan.

as 38 being reported in a single season. When the Earl of Selkirk sent out his Red River colonists he landed them at the mouths of the Nelson and Churchill rivers, from where they made their way by the Hayes and Nelson rivers to lake Winnipeg and the junction of the Red and Assiniboine rivers.

Thus the first line of communication between Great Britain and the agricultural settlements on the plains of Western Canada was established by way of Hudson bay. Agitations and schemes for the improvement of this route were launched at an early date in the history of the settlement. Included in these schemes was a plan to improve the Nelson river by a series of locks to overcome its numerous rapids so as to provide a waterway for small canal boats from the head of lake Winnipeg to Port Nelson. It is interesting to surmise what developments Great Britain would have carried out by this date had her possessions in North America, or the northern part of North America, been limited to Prince Rupert's Land.

The building of the Canadian Pacific railway temporarily solved the transportation problems of the West, nevertheless the prospect of a shorter and cheaper haul to Great Britain by the Hudson Bay route was not to be denied. As early as 1884 a Select Committee of the Legislative Assembly of Manitoba brought down a report dealing with this matter: The issue has been kept continuously before the Canadian public since that date.

Hudson Bay Railway

Plans for a Hudson Bay railroad assumed definite shape in 1910 when a branch line of the Canadian Northern railway was completed from Hudson Bay Junction, on its Winnipeg-Prince Albert section, to The Pas, and the building of a government line from The Pas to Hudson bay was authorized by parliament. Work on the Hudson Bay railroad was commenced the following year with Churchill as objective. The proposed route lay entirely to the north of Nelson river and measured 474 miles. A townsite had been surveyed at Churchill in 1908 and it was confidently expected that this natural port would be developed in the course of a few years.

Before much progress had been made on the building of the railway, or any at Churchill other than surveys, the government of the day decided to make Port Nelson the terminus of the road in place of Churchill. The location of the railroad was altered accordingly. The new survey crossed the Nelson river twice, at Manitou rapids and at Kettle rapids. The route was shortened by 50 miles, the total distance from The Pas to Port Nelson being 424 miles, but the developing of harbour facilities at the newly selected port involved greater efforts than at Churchill.

The right of way was cleared and graded to Port Nelson and steel was laid, before the end of 1916, as far as Kettle rapids, 332 miles from The Pas. A very substantial steel bridge of a single 1,000-foot span was erected at this crossing of the Nelson. Considerable work, involving the expenditure of about \$6,000,000, was done on the development of terminal facilities at Port Nelson. Owing to the war and consequent lack of men and steel, operations were suspended before the project was completed and for some years only part of the completed railway was kept in repair. A very limited service was maintained between The Pas and Pikwitonei at Mile 214. In 1926 and following years the roadbed was re-conditioned and about 25 miles additional steel was laid.

Location Considerable controversy as to the merits of Nelson
Diverted and Churchill as terminal harbours having arisen, the
 government, in 1927, retained Mr. Frederick Palmer,
 eminent British engineer, to examine both sites and advise regarding
 their suitability. His report, strongly in favour of Churchill, led the
 government to promptly abandon further construction on the Nelson
 route and to have its engineers locate a diversion from the end of
 steel to the more northerly harbour, a distance of approximately 154
 miles. The length of the railroad from The Pas to Churchill will be
 511 miles by the resulting route. This is 37 miles more than the
 original location between the same points or 87 miles more than the
 Port Nelson location. Construction work is now under way and
 it is expected that the whole line will be open to traffic in the
 spring of 1930.

Churchill Harbour

Hudson bay, especially its western and southern coasts, is deficient in good harbours. The mouths of the Nelson and Churchill rivers afford the only natural shelter in these parts for vessels of any depth. That of the Nelson is more in the nature of an open roadstead than of a harbour. Moreover it is difficult of approach and though admitting of extensive improvements can be developed only at great cost.

The mouth of the Churchill is bottle-shaped with the neck opening to the sea, thus giving a natural land-locked harbour. A projecting headland and an island further shelter the opening so that storms from any direction have little influence on the inner waters. Rocky cliffs, from 40 to 70 feet high, enclose the harbour, which is 6 miles in length and from 1 to $2\frac{1}{2}$ miles wide at low water or from $1\frac{1}{2}$ to 4 miles wide at high water. The entrance has a low-water width of 1,600 feet, of which a width of 850 feet has a depth of 30 feet or over, 750 feet of this being 60 feet or more in depth.

In its natural condition Churchill harbour has accommodation for 3 or 4 vessels up to 30 feet in draught and as many more of 24 feet draught. With a little dredging the capacity of the harbour can be easily increased to accommodate as many and as large vessels as ever will be likely to tax its capacity, and, according to Mr. Frederick Palmer, at a much more reasonable cost than such provision at Nelson would entail.

Government Townsite Churchill also lends itself readily to the construction of railway terminals, docks and trans-shipping arrangements generally. The townsite is government owned. As far as railway construction, port terminals and harbour facilities are concerned there is no serious obstacle to the completion of the Hudson Bay scheme.

Shipping Distances The following comparison of sailing distances from Churchill and other North American ports to Liverpool is significant. The shortest distances are quoted where there are alternative routes.



Entrance to Churchill Harbour. Ruins of Fort Prince of Wales in Background.



Hudson Bay Railroad Bridge over Nelson River at Kettle Rapids, Manitoba.

Comparison of Sailing Distances

Churchill to Liverpool (Appx)	.....	2,936	nautical miles
Nelson	" ( " )	.....	2,966 "
Montreal	"	.....	2,760 "
Quebec	"	.....	2,625 "
Saint John	"	.....	2,717 "
Halifax	"	.....	2,485 "
Portland	"	.....	2,776 "
New York	"	.....	3,036 "

To ship grain from the prairies to Churchill involves a shorter rail haul, on the average, than to ship it to the head of the lakes at Fort William or Port Arthur. If Saskatoon be taken as a fairly central point in the grain belt, the length of haul to Churchill by way of Warman, Humbolt, Melfort and Hudson Bay Junction is 834 miles. To Fort William it is 890 miles by the shortest routing, or farther on any one line of railway. From Fort William to Montreal the shipping distance by the Great Lakes route is 1,216 miles, involving a trans-shipment at Port Colborne.

Ice Investigations

The most serious obstacle to the success of the Hudson Bay route is undoubtedly the ice conditions that prevail for several months of each year in Hudson strait. The bay itself is open the year around except for shore ice which forms for several miles out to sea and for floe ice which occasionally drifts in from the strait or originates from the breaking up of the shore ice. Though Churchill harbour freezes over during the winter months, the length of its shipping season could be extended by the use of icebreakers.

Ice Hazards in Straits Heavy ice from Foxe basin drifts down through Foxe channel into Hudson strait and proves a serious menace to navigation. The passage of ships has frequently been delayed or entirely prevented by this cause. It is claimed that such ice seldom blocks the whole strait at any given time but is carried by winds and currents from one side to

the other. Navigators encountering these large floes of ice and not being able to see far enough to spot the open lanes, especially if fog prevailed, were compelled to halt and wait for such openings as could be seen from the lookout.

A preliminary study of ice conditions in general and of the extent to which aids to navigation might be advantageously employed in Hudson strait has been completed recently by the Canadian government. Three bases were established from which frequent air patrols were made over the water or ice. These bases were located at Port Burwell, Wakeham bay and Nottingham island. The establishment of further stations on a permanent basis as aids to navigation will be undertaken at an early date and carried to completion by the time the railway and harbour are officially opened for traffic.

The work of erecting these stations is in the hands of the Radio Branch of the Department of Marine and Fisheries, and that service will carry on their subsequent operation. The use of radio direction finding equipment will enable ships equipped with radio to navigate the strait in all kinds of weather. The chain of stations to be erected at strategic points along Hudson strait will be able to communicate with the station at Belle Isle, which is the easterly terminus of the Gulf of St. Lawrence chain, and with Churchill, which connects with the landline system, thus forming a complete loop of radio communication around Hudson bay and strait.

Railway Extensions

Already the presence of minerals in stupendous quantities tributary to the main line of the Hudson Bay railroad has been proved and resultant development undertakings have made necessary the building of a branch line to Flinflon. This branch runs northerly and northwesterly from a point about 7 miles beyond The Pas. The total length is 88 miles. Contracts for building an extension or an off-shoot of this branch to the Sherritt-Gordon mine have been let. This will involve an additional 42

miles or so of line. It is quite within the bounds of probability that other branch lines will be necessary before many years as the mineral riches of the region are further uncovered. It is altogether probable that the Hudson Bay railway in itself will prove a profitable factor in developing the hinterlands of Canada.

The Hudson Bay Railway, being now a part of the Canadian National System, has direct connection with Winnipeg, Prince Albert and other western centers. Its southern terminus, The Pas, is 483 miles from Winnipeg.

T. and N. O. Railway The Temiskaming and Northern Ontario railway, an Ontario Government enterprise, was commenced in 1902 and built entirely within the pre-Cambrian area as a pioneering and colonization road. Hopes were expressed by its sponsors that its construction would result in the discovery of ores and minerals. The venture has proved most successful and great resources of minerals, timber, agricultural lands and water powers have been made available for development as a result.

Its main line runs from North Bay to Cochrane, a distance of 254 miles, and, with branch and subsidiary lines, serves the major part of Northern Ontario's famous gold and silver fields. The extending of the main line from Cochrane toward James bay has been under way for some time. A service is maintained at present as far as Island Falls Junction, 43 miles north of Cochrane, and construction work has been completed several miles farther.

General Travel

Means of transportation throughout the Hudson Bay region, aside from that afforded by the railways mentioned, are still very limited. Steamboats operate on lake Winnipeg and the Saskatchewan river and small power boats have been placed on some of the larger lakes by mining and fishing operators. A few roads have been built into the principal camps but no system of highways exists. Scows are made use of in carrying supplies from points on Northern Ontario railways to James bay by way of the larger rivers.

Outfitting and Distributing Bases As yet there are no set schedules of sailings to Hudson bay but vessels are outfitted and despatched thereto by the principal fur trading companies once-a year, and other expeditions sail for these waters from time to time as circumstances arise. The Canadian ports most favourable as bases for such voyages are Montreal, Quebec, St. John, Halifax and Sydney.

Overland expeditions to the Chibougamau and Mistassini districts and the eastern shores of Hudson and James bays, if outfitted in Quebec, can be routed by rail some 233 miles to a point well beyond the north shore of lake St. John. Waterways leading to James bay are intercepted also by the main transcontinental line of the Canadian National railway, west of Quebec city.

Cochrane, which might be considered the local centre of the James bay region, is 574 miles west of Quebec city via the Canadian National transcontinental railway and 254 miles north of North Bay via the T. and N. O. railway. North Bay is about 343 miles west of Montreal or 227 miles north of Toronto.

The Pas is the local distributing center for Northern Manitoba and the west coast of Hudson bay. Its primary bases are Winnipeg, Saskatoon and Regina. Winnipeg has also a steamer service to Norway House during summer months. The more westerly parts of the northern mineral area, including lac la Ronge and Reindeer lake, are accessible by canoe routes during the summer and sleigh roads during the winter from Prince Albert.

Excellent Canoe Routes Canoes for summer travel and dog sleighs for winter travel are still very much in vogue. Many of the old canoe routes of fur-trade days are now followed by mineral seekers and others more interested in modern development enterprises. They are being followed also by ever increasing numbers of out-door enthusiasts who find them the setting for unusually attractive holiday expeditions. Historic associations and present day developments furnish absorbing interest, while the many beautiful lake expansions and rushing torrents of white water that call for negotiation satisfy the desire for beauty in nature and thrill in travel.

READING LIST

Note.—A complete bibliography of the Hudson Bay Region would include hundreds of books and documents, many of which are now unavailable to the general public. Works consulted in the preparation of the preceding article include many government reports that are out of print, copies of which are to be found in libraries only. The following selected list of publications is given merely as suggestions for further reading by those interested in Hudson Bay affairs at large and is restricted to such works as can be secured from ordinary book stands or government offices, or that can be consulted or borrowed in public libraries.

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Aerial View of Norway House, Manitoba.



Entrance to Wakeham bay, south shore of Hudson strait. Hudson's Bay Company's post on right; Revillon Frères' post in centre.

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Revillon Frères' trading schooner at anchor at Port Harrison, on east shore of Hudson Bay.



Eskimo about to harpoon a seal.

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